PORTABLE VACUUM CLEANER AND METHOD

Background of the Invention

This invention relates to a portable vacuum cleaner and method for wet and dry pickup especially suitable for industrial uses employing high vacuums, portability and maneuverability facilitating discharging of material collected during vacuuming.

Vacuum cleaners for industrial use have a common problem in that it is difficult to exert a high suction and at the same time provides adequate discharge apparatus for expelling waste material received within the vacuum chamber. For example, U.S. Patent Nos. 3,496,592 and 3,619,849 illustrate the use of free standing hoppers or vacuum chambers carried on wheeled platforms for wet pickup in carpet cleaning. It is necessary in such vacuum cleaners to provide suitable pumps within the bottom of the tanks to forcefully expel waste water through a line provided for that purpose. Additional discharge problems are illustrated in U.S. Patent No. 4,467,494 where lint collection bags are utilized. The use of collection bags is impractical for industrial use where pressure drops are increased as well as costs, together with limited air flow.

The invention of U.S. Patent No. 4,934,017 concerns itself with removing liquid waste material by utilizing a dump valve

located on a lower front side of a vacuum chamber collection tank.

The disclosure of U.S. Patent No. 5,090,083 relates to eliminating the task of manually removing and emptying collection bags through the use of filter tubes.

Summary of the Invention

The invention contemplates an industrial vacuum cleaner having an upright hopper mounted in a portable frame provided with a discharge chute having a pivoted gate operated by external linkage.

Accordingly, it is an important object of the invention to provide a discharge chute as a bottom for upright vacuum cleaners to facilitate removal of liquid or solid waste collected therein.

Another object of the invention is the provision of an upright wheeled frame within which is positioned a hopper having a centrifugal fan at the top with discharge apparatus at the bottom of the hopper.

Another object of the invention is the provision of a method for emptying trash by the use of a lift truck to raise the vacuum cleaner for convenient discharge through a chute at the bottom of the vacuum cleaner.

It has been found that by utilizing linkage positioned on an upright vacuum hopper and including a toggle mechanism, constant force may be provided to urge a gate into sealing engagement at a discharge end of a waste chute preparatory to opening of the chute for convenient discharge of industrial trash collected in the hopper.

Brief Description of the Drawings

The construction designed to carry out the invention will be hereinafter described, together with other features thereof.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings forming a part thereof, wherein an example of the invention is shown and wherein;

Figure 1 is a right front perspective view illustrating hopper and vacuum hose connections for a portable industrial vacuum cleaner constructed in accordance with the invention;

Figure 2 is a right side elevation of a vacuum hopper and frame mounting illustrating a bottom discharge chute for convenient waste disposal;

Figure 3 is a front elevation illustrating an upright hopper with vacuum hose connections fixedly mounted in an upright frame having receptacle apparatus for reception of a lift operator such as the forks of a lift truck;

Figure 4 is an enlarged side elevation illustrating external linkage including a toggle joint for operating a pivotal gate for opening and closing the discharge chute;

Figure 5 is a right side elevation illustrating operating

linkage, wheels such as casters, and lift receptacles for a vacuum cleaner constructed in accordance with the invention;

Figure 6 is a front elevation further illustrating operating mechanism for the gate together with wheel and lift devices for the vacuum cleaner; and

Figure 7 is a right front perspective view illustrating a method including the step of raising the vacuum cleaner for convenient discharge of waste.

Description of a Preferred Embodiment

The drawings illustrate a portable vacuum cleaner having a upright frame A. An upright hopper B having an open top is carried within the frame. A closure cover C is provided for closing the open top of the hopper. Mechanical apparatus D evacuating air from the hopper creating a partial vacuum is preferably carried on the cover for collecting waste material collected within the hopper. A discharge chute E is carried adjacent a lower end of the hopper. A gate F normally closes the discharge chute for retaining material collected in the hopper, and linkage G is carried adjacent to and externally of the hopper opening the gate discharging the material from the hopper. Wheels H are carried by the frame for transporting the vacuum cleaner. At least one receptacle I is carried by the frame for receiving a lift truck operator.

The linkage G includes a toggle apparatus J that in post center position exerts a continuous force urging the gate to closed position locking the gate in sealing relation against unwanted movement. When on center the toggle joint acts as a single link for exerting pivotal movement opening the gate allowing waste collected in the chute to be expelled therefrom by

gravity.

Referring more particularly to the drawings an upright generally rectangular frame A includes four corner post each having a fixed mounting on a lower platform that includes a horizontal frame member 10 carrying the receptacles I as well as the wheels H as is best seen in Figures 4-7. An upright hopper B has a generally rectangular configuration to fit within the upright frame in which it is fixedly mounted as by welding, not shown.

A closed cover C is provided for maintaining the open top of the hopper B in a closed configuration supporting centrifugal fans D for creating a partial vacuum within the hopper B. The centrifugal fans have a lower housing 11 containing the fan blade, not shown. A suitable motor is carried above the fan in the housing 12.

The discharge chute E includes a bottom 13 disposed at an angle of approximately 45 degrees. The discharge chute includes a member 14 opposite the bottom member 13 defining a chute of progressively reduced or inwardly tapering cross section. A terminal chute section 15 extending is a continuation of the bottom 13 has a vertical longitudinal opening 16 therein.

The vertical opening 16 of the discharge chute E is closed by a gate F on a pivoted shaft as illustrated at 17 in Figure 4.

The gate has a suitable link 18 welded thereto for urging the gate into sealing engagement with a deformable gasket 19. The link 18 has pivotal connection as at 20 with the lower end of a toggle joint J. The upper end of the toggle joint is pivotally connected at 21 with a link 22 that has fixed connection with a rotatable shaft 23 which in turn has fixed connection with a handle 24 for manual manipulation of the linkage.

Figure 1 best illustrates connections 25 for each of the suction hoses 26, 27 and 28 that may be used separately or all at one time. The hose 28 is provided with a wand take up as at 29. The hoses 26 and 27 are provided with more conventional flat pickup collection attachments 30. Figure 7 illustrates the method including the use of a fork lift truck 31 to raise the vacuum cleaner to facilitate the discharge of waste through the chute E and the opening 16 at a desired location.

Vacuums cleaners constructed in accordance with the invention have proved in trials to be useful in cleaning up in a concrete block factory. For example, by utilizing a two inch hose, 110 inches water left, and 500 CFM of air flow, a successful clean up was achieved. It is believed that vacuum cleaners may be constructed in accordance with the invention for clean ups for most metal working and machining operations as well as a myriad of other industrial cleansing applications.

While a preferred embodiment of the invention has been described using specific terms, such description is for illustrative purposes only, and it is to be understood that changes and variations in the hopper and discharge chute as well as related components and method may be made without departing from the spirit or scope of the following claims.